IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	Confirmation No.: 4456
Wei Li, et al	Group Art Unit: 2162
Serial No.: 10/643,629	Examiner: Shahid Al Alam
Filed: August 18, 2003	
For: FREQUENT ITEMSET COUNTING USING CLUSTERED PREFIXES AND INDEX SUPPORT	

Via EFS-Web
Commissioner for Patents
P. O. Box 1450
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REPLY BRIEF

Sir:

This Reply Brief is submitted in response to the Examiner's Answer mailed on May 14,

2008.

I.   STATUS OF CLAIMS

Claims 21-28 have been finally rejected and are the subjects of this appeal. Claims 29-34 are objected, but would otherwise be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims. Claims 1-20 and 35-40 were canceled during prosecution.

II.   GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 21-28 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 6,324,533 issued to Agrawal et al. ("*Agrawal*").

III.   ARGUMENTS

A. The Features of Claims 21 and 22 Are Not Anticipated by Agrawal

Claim 21 recites a method for performing a frequent itemset operation in phases. Claim 21 requires, among other things, "during at least one phase of the plurality of phases... *grouping the candidate combinations into clusters, wherein each cluster corresponds to a common combination of items,* and wherein all candidate combinations in a given cluster include the common combination of items associated with the cluster." The Examiner alleges that all limitations in Claim 21 are anticipated by *Agrawal*. While it is true that *Agrawal* describes an approach for performing a frequent itemset operation in phases, *Agrawal* lacks any teaching or suggestion of anything analogous to a cluster as claimed.

In the Examiner's Response, Examiner asserts that "disclosure need not be express in order to anticipate. Even if a prior art inventor does not recognize a function of his or her process, the process can anticipate if that function was inherent. To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be recognized by persons of ordinary skill." (*Examiner's Answer*, p. 10).

The Examiner cited *Agrawal*, Col. 5, lines 41-47, as anticipating the limitation of Claim 21 reciting grouping the candidate combinations into clusters. However, Col. 5, lines 41-47 merely states, *in toto*:

> The candidate generation procedure ensures that C_k is a superset of the set of all frequent k-itemsets. The algorithm builds a specialized hash-tree data structure in memory out of C_k. Data is then scanned in the support counting phase. For each transaction, the algorithm determines which of the candidates in C_k are contained in the transaction using the hash-tree data structure and

> increments their support count. At the end of the pass, C_k is
> examined to determine which of the candidates are frequent,
> yielding F_k. The algorithm terminates when F_k or C_{k+1} becomes
> empty.

What is described in the cited passage of *Agrawal* is how candidate itemsets are counted during a pass or phase. Nothing is taught or suggested that even remotely may be interpreted as grouping the candidate combinations into clusters.

In addition, the Examiner states, in Office Action mailed July 12, 2007, p. 4:

> The frequent 1-itemsets and 2-itemsets are generated by referring
> a transaction table to obtain candidate set of (n+2)-itemsets and
> frequent(n+2)-itemsets using a query operation. The generation of
> frequency itemsets is repeated until the candidate set is empty. The
> mining rules are generated from the union of determine frequency
> itemsets. See abstract and C4:L57-67.

This describes how a phase or pass is generated, and not anything to do with grouping into clusters *after a set of candidate combinations has already* been determined. Rather, in *Agrawal*, candidate sets are generated based upon frequent itemsets of one less item.

In Claim 21, "each phase is associated with combinations that have a particular number of items." *Then*, once the candidate combinations within a phase are determined in Claim 21, "during at least one phase of the plurality of phases, performing the steps of determining candidate combinations that are to be evaluated during the phase; *grouping the candidate combinations into clusters*." *Agrawal* does *not* disclose grouping any candidate combinations into clusters *after* "determining candidate combinations that are to be evaluated during the phase." Rather, it is apparent that *Agrawal* lacks this limitation. Both sections of *Agrawal* cited by the Examiner refer to candidate *generation*, and *not* grouping candidate combinations *after* the candidate combinations have already been generated.

In the Examiner's Answer, the Examiner alleges that "*grouping the candidate combinations into clusters*" is inherent in *Agrawal*. This is simply not the case even when the

"claim limitations are given their broadest reasonable interpretations in light of the specification." (Examiner's Answer, p. 7). The Examiner states "The method includes the steps of: a) performing a group-by query on the transaction table to generate a set of frequent 1-itemsets; b) determining frequent 2-itemsets from the frequent 1-itemsets and the transaction table; c) generating a candidate set of (n+2)-itemsets from the frequent (n+1)-itemsets, where n=1; d) determining frequent (n+2)-itemsets from the candidate set of (n+2)-itemsets and the transaction table using a query operation; e) repeating steps (c) and (d) with n=n+1 until the candidate set is empty; and f) generating rules from the union of the determined frequent itemsets." (Examiner's Answer, p.7, taken from Claim 1 of *Agrawal*). From this, the Examiner states "The above teaching clearly teaches Appellant's claimed clustering as argued." (Examiner's Answer, p.7).

However, the stated Claim 1 still does not anticipate the referenced limitations of Claim 21. In Claim 21, "each phase is associated with combinations that have a particular number of items…" and *then*, once the candidate combinations within a phase are determined, "…performing the steps of determining candidate combinations that are to be evaluated during the phase; *grouping the candidate combinations into clusters*." *Agrawal* never discloses grouping any *candidate combinations* into clusters *after* "determining candidate combinations that are to be evaluated during the phase."

It is believed that an incorrect interpretation is made by the Examiner. The Examiner states, "A set of frequent 1-itemsets is generated using a group-by query on data transactions. From these frequent 1-itemsets and the transactions, frequent 2-itemsets are determined. A candidate set of (n+2)-itemsets are generated from the frequent 2-itemsets, where n=1. Frequent (n+2)-itemsets are determined from candidate set and the transaction table using a query operation. The candidate set and frequent (n+2)-itemset are generated for (n+1) until the

candidate set is empty. Rules are then extracted from the union of the determined frequent itemsets... Agrawal's teachings of different approach of joining and generation of frequency itemsets clearly teaches Applicant's claimed argument." (Examiner's Answer, p. 9). However, as is clear by reading Claim 1 and even the explanation from the Examiner, *Agrawal* _only_ states each phase as 1) generating a candidate set for a number of items and *then* 2) determining the frequent itemsets based on the transaction table. No clustering, or anything analogous to clustering, occurs for candidate combinations (of the same number of items) *prior to* "determine whether the candidate combinations satisfy a frequency criteria." Thus, joining and generating frequency itemsets in no way "make[s] clear that the missing descriptive matter [grouping candidate combinations into clusters] is necessarily present in the thing described in the reference, and that it would be recognized by persons of ordinary skill" and as such, *Agrawal* does not anticipate the limitations of Claim 21.

Therefore, the Examiner has *failed* to demonstrate that *Agrawal* discloses *all* of the limitations of Claim 21. Claim 22 recites a computer-readable storage medium that carries instructions for performing the steps of the method of Claim 21, including the features distinguished from _Agrawal_. As a result, Claims 21 and 22 are patentable over *Agrawal* under 35 U.S.C. § 102(b). The rejection of Claims 21 and 22 should be reversed.

B. Claims 23-28 Are Not Anticipated by Agrawal

As no additional Examiner Answer has been received for Claims 23-28, the arguments made by Appellants in the Appeal Brief still hold and have not been reiterated here. Claims 23-28 are patentable over *Agrawal* under 35 U.S.C. § 102(b) under the arguments made in the Appeal Brief and the rejection of Claims 23-28 should be reversed.

C. CONCLUSION AND PRAYER FOR RELIEF

Based on the foregoing, it is respectfully submitted that the rejections of Claims 21-28 under 35 U.S.C. § 102(b) as being unpatentable over the cited art lack the requisite factual and legal bases. Appellants respectfully request that the Honorable Board reverse the rejections of Claims 21-28 under 35 U.S.C. § 102(b).

Respectfully submitted,
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